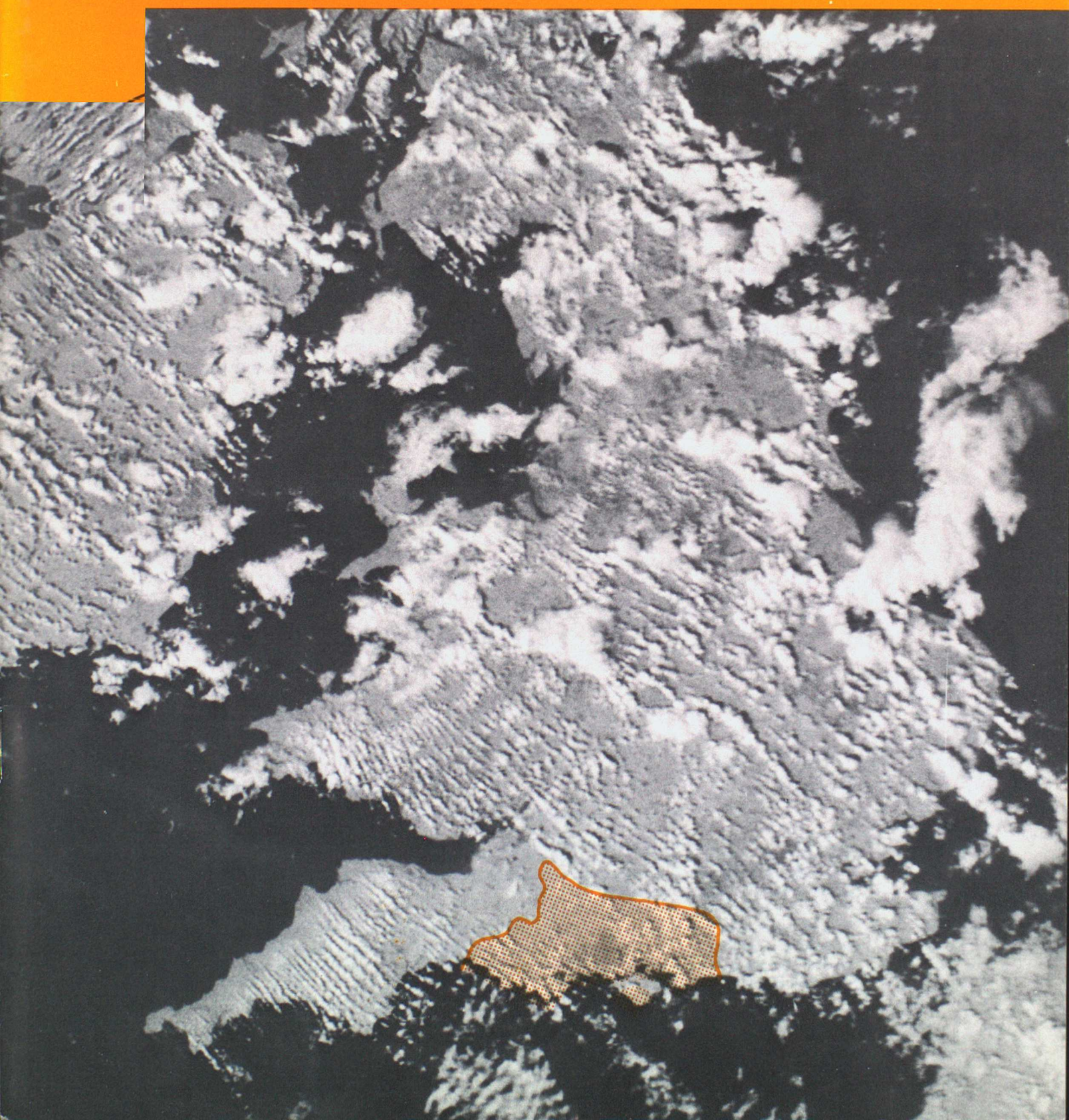
THE CLIMATE OF GREAT BRITAIN

SOUTH ENGLAND

Climatological Memorandum 137



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The front cover shows a view of England and Wales from satellite Tiros-N taken at 1518 GMT on Wednesday 2 April 1980 — photograph by courtesy of the Department of Electrical Engineering and Electronics, University of Dundee.

An anticyclone was situated to the south-west of the British Isles and a showery north-westerly airstream covered Britain. The alignment of the clouds with the surface wind is clearly seen. South England had about 10 hours of sunshine with a few rain showers in the afternoon and maximum temperatures about 12 ^{o}C.

THE CLIMATE OF GREAT BRITAIN

Climatological Memorandum 137

South England

INTRODUCTION

This memorandum is one of a series which will cover the whole of Great Britain and seeks to present the main features of the climate of the area in a form suitable for use in schools and by members of the general public.

There is an Introduction to the series (Climatological Memorandum 113) which explains how the various weather elements are measured and defines some of the more common terms.

Industrial and commercial interests who are concerned with meteorological information for planning and design will probably require more complex analyses of the available data, and details of the services offered by the Meteorological Office to meet those needs are given on page 18.

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Met O 3 (Advisory Services)

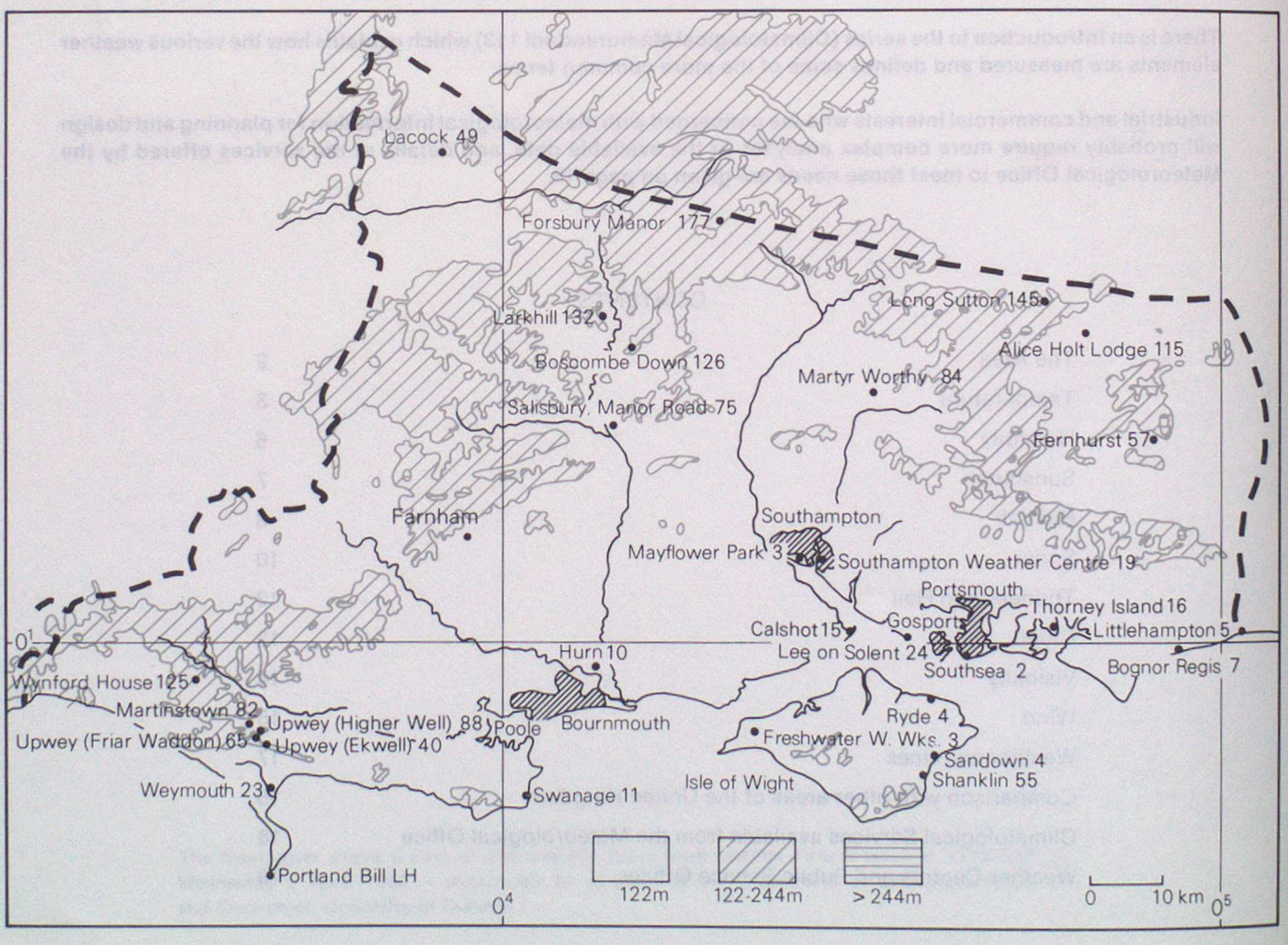
THE AREA

This memorandum describes the main features of the climate of South England. The area consists of Dorset, the Isle of Wight, much of Wiltshire and Hampshire and those parts of Surrey and Sussex to the west of the Arun and Wey valleys. The region is basically a basin surrounded by chalk uplands and bounded in the south by the English Channel. In the west are the Dorset Downs, to the north Salisbury Plain which is a military training ground, and in the east the Hampshire Downs and the westward extension of the South Downs. Most of the rivers in the area, such as the Avon and Itchen, flow southwards to the English Channel. These rivers formed important communication routes on which the early towns like Salisbury and Winchester developed. In the south of the area is the New Forest, an unfenced area of open heath and woodland, and people living here have the right to graze their animals. The agricultural use of land is varied, concentrating mainly on market garden crops, pigs and poultry for the large towns of the area.

South England is a popular tourist area containing famous landmarks like Stonehenge and the Needles. The chalk and limestone rocks of the area, apart from giving the picturesque coastline, are also quarried for Portland and Purbeck stone. Southampton, the largest town in the area, is one of the major ports in the country benefiting from double tides and a comparatively low tidal range. Crude oil accounts for over 50 per cent of the imports and petroleum products are among the major exports. Fawley on the opposite side of Southampton water is the largest oil refinery in Britain. Exploration for oil is currently proceeding both onshore and offshore in the area. Other major towns are Portsmouth with its dockyards, the home of the British Navy, and Bournemouth, a leading south coast holiday resort.

The map shows the topography of the region and the locations of the climatological and rainfall stations for which data are given in this memorandum.

Topography of the area and locations and altitudes (in metres) of the stations
Co-ordinates are national grid references



TEMPERATURE

The mean annual temperature over the region varies from just over 9 °C over high ground inland to around 10.5 °C near the coasts. Over the British Isles mean annual temperatures range from about 7 °C in the Shetland Isles to over 11 °C in the extreme south-west of England and the Channel Islands.

Temperature shows both seasonal and diurnal variations. January is on average the coldest month with mean daily minimum temperatures varying from over 2.5 °C around the coasts of the Isle of Wight to near zero at some inland locations. This compares with −1.0 °C in parts of Tayside and Grampian to over 5.5 °C in the Isles of Scilly.

Minimum temperatures normally occur around sunrise and extreme minimum temperatures usually occur in January or February, though some locations in the area have recorded extremes in December or March. The lowest known temperature recorded in the area was −18.2 °C at Lacock on 13 December 1981. Along the coasts the lowest recorded temperatures have only been around −12 °C.

Mean daily maximum temperatures are highest in July and range from around 19 °C around the coasts to nearly 22 °C at some inland locations. The modifying effect of the sea which keeps the coastal locations relatively warm in winter has the reverse effect in the summer. The highest mean daily temperatures in the British Isles of 22.5 °C occur in the London area and the lowest of 15 °C in the Shetlands. Maximum temperatures normally occur 2 to 3 hours after midday and extreme temperatures occur in June, July or August. The highest known temperature recorded in the area was 35.6 °C at Mayflower Park, Southampton on 28 June 1976.

The variation of mean maximum and mean minimum temperatures together with extreme temperatures recorded at four locations in the area is shown in Figure 1. There is a marked similarity between the curves of mean values but more variation in the extremes which reflect the differing topographical features of the locations as well as the period over which the data have been recorded. Boscombe Down has the highest daily maximum temperatures in summer and the lowest daily minimum temperatures in winter compared with the three coastal locations; it also has for most months the extreme temperatures recorded.

Table 1 gives the average number of days during 1961–80 that maximum and minimum temperatures at Ryde and Alice Holt Lodge occurred in the ranges specified. The most striking feature of the Table is the wide range of maximum and minimum temperatures which can occur at any time of the year. The modifying influence of the sea means that the range of temperatures is less at Ryde than at Alice Holt Lodge which has more occasions of both high and low temperatures.

FIGURE 1 Average air temperatures over the period 1941–70 and absolute daily maximum and minimum air temperatures over the specified periods.

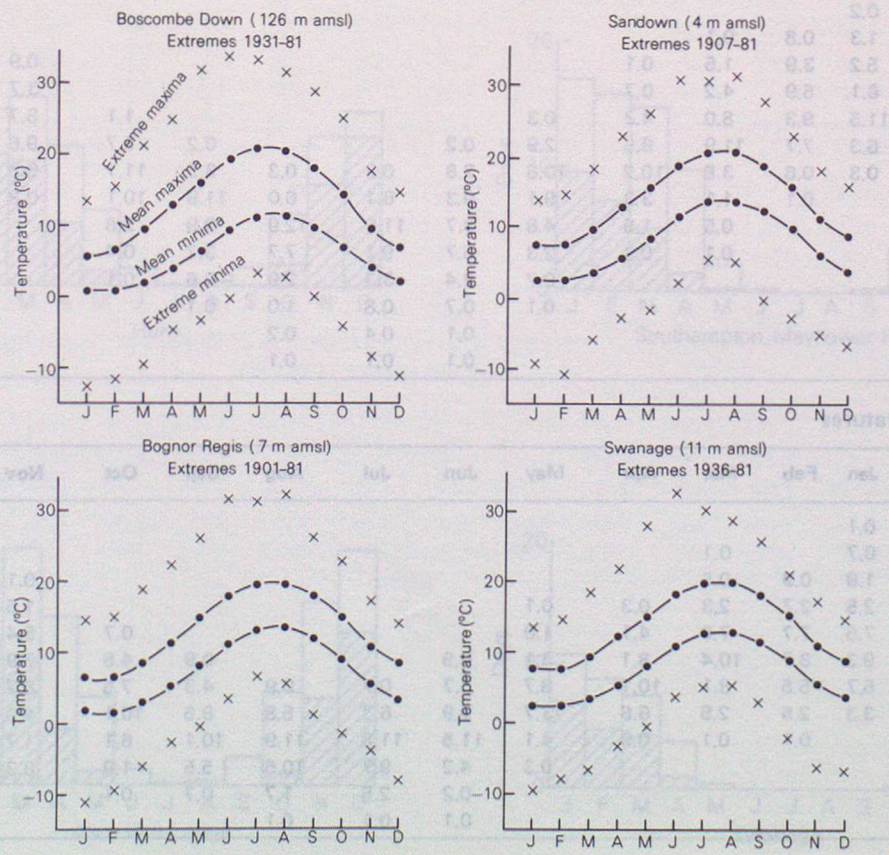


TABLE 1 Average numbers of days of maximum and minimum temperatures (°C) in ranges specified for the period 1961–80

Ryde

Maximum temperatures

Range	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
												0.1	0.8
−3.0 to −0.1	0.5	0.2									0.1	1.7	7.5
0.0 to 2.9	3.0	2.3	0.5								1.6	4.9	21.4
3.0 to 5.9	5.9	5.5	3.3	0.3						0.1	6.5	9.1	46.3
6.0 to 8.9	9.3	9.3	8.5	3.3	0.1					3.7	10.3	11.0	72.3
9.0 to 11.9	11.5	9.7	13.9	10.2	2.1								
12.0 to 14.9	0.7	1.1	4.1	12.1	12.6	2.3		0.1	1.1	10.1	9.9	4.3	58.5
15.0 to 17.9		0.1	0.8	3.6	11.4	10.4	4.5	3.4	12.9	14.1	1.7	0.1	62.9
18.0 to 20.9				0.5	3.3	10.9	13.7	17.3	13.4	2.9			62.1
21.0 to 23.9					1.4	5.1	10.5	7.9	2.4				27.3
24.0 to 26.9					0.2	0.7	1.9	2.1	0.1				5.0
27.0 to 29.9						0.3	0.3	0.3					0.8
30.0 to 32.9						0.1	0.2						0.3

Minimum temperatures

Range	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
−9.0 to −6.1	0.2												0.2
−6.0 to −3.1	1.4	0.6	0.3									0.5	2.9
−3.0 to −0.1	4.9	3.7	2.4	0.3							0.9	3.9	16.1
0.0 to 2.9	8.1	9.7	8.9	4.1	0.4					0.5	5.6	8.1	45.4
3.0 to 5.9	9.2	8.7	12.5	11.3	2.7	0.1			0.3	3.0	8.5	9.4	65.6
6.0 to 8.9	6.7	5.3	6.8	12.3	15.3	2.8	0.1	0.5	3.3	8.4	9.7	6.7	77.9
9.0 to 11.9	0.5	0.3	0.1	2.0	11.3	13.5	6.6	5.1	10.0	12.3	4.5	2.4	68.5
12.0 to 14.9					1.3	12.3	16.3	16.7	12.5	6.1	0.9	0.1	66.3
15.0 to 17.9						1.1	7.6	8.3	3.9	0.7			21.6
18.0 to 20.9						0.1	0.3	0.3					0.9

Alice Holt Lodge

Maximum temperatures

Range	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
−6.0 to −3.1	0.2												0.2
−3.0 to −0.1	1.3	0.8	0.1									0.6	2.8
0.0 to 2.9	5.2	3.9	1.5	0.1							0.9	4.3	15.9
3.0 to 5.9	6.1	5.9	4.2	0.7							3.7	6.7	27.4
6.0 to 8.9	11.5	9.3	8.0	4.3	0.3					1.1	8.7	9.0	52.4
9.0 to 11.9	6.3	7.7	11.9	9.5	2.9	0.2			0.2	5.7	9.6	8.3	62.3
12.0 to 14.9	0.3	0.6	3.8	10.2	10.8	2.8	0.3	0.3	3.5	11.1	6.3	2.0	52.2
15.0 to 17.9		0.1	1.1	3.3	9.1	9.3	6.1	6.0	11.9	10.1	0.8		57.7
18.0 to 20.9			0.5	1.5	4.8	8.7	11.0	12.9	9.9	2.6			51.7
21.0 to 23.9			0.1	0.3	2.3	5.7	9.1	7.7	3.7	0.4			29.1
24.0 to 26.9					0.7	2.4	3.3	2.9	0.6	0.1			10.0
27.0 to 29.9					0.1	0.7	0.8	1.0	0.1				2.7
30.0 to 32.9						0.1	0.4	0.2					0.6
33.0 to 35.9						0.1	0.1	0.1					0.3

Minimum temperatures

Range	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
−15.0 to −12.1	0.1												0.1
−12.0 to −9.1	0.7		0.1									0.1	0.9
−9.0 to −6.1	1.9	0.9	0.5								0.1	1.3	4.5
−6.0 to −3.1	2.5	2.7	2.3	0.3	0.1						1.5	3.3	12.7
−3.0 to −0.1	7.5	7.7	7.0	4.1	1.0					0.7	5.4	7.5	40.9
0.0 to 2.9	9.3	8.7	10.4	8.1	3.1	0.5			0.9	4.5	7.9	8.4	61.9
3.0 to 5.9	5.7	5.5	8.1	10.1	8.7	3.7	0.7	0.9	4.3	7.5	8.2	5.7	69.3
6.0 to 8.9	3.3	2.5	2.5	6.6	13.7	9.9	6.3	5.8	8.5	10.1	4.9	3.3	77.4
9.0 to 11.9		0.1	0.1	0.9	4.1	11.5	11.8	11.9	10.1	6.1	1.7	1.3	59.6
12.0 to 14.9					0.3	4.2	9.7	10.6	5.5	1.9	0.3		32.5
15.0 to 17.9						0.2	2.5	1.7	0.7	0.1			5.1
18.0 to 20.9						0.1	0.1	0.1					0.2

The average number of days a year of air frost in South England varies from about 20 to 45 around the coasts to over 60 inland. For ground frosts the values vary between 45 to over 120. At some of the more sheltered locations a ground frost may occur at any time of the year but the summer months are usually free from air frosts. Figure 2 gives the average number of days of air and ground frosts for four locations in the area over the period 1961–80. Hurn has a much higher incidence of frost than might be expected for a site relatively close to the sea. The reason is the predominance of sandy soils and the fact that it is located in a shallow hollow. See also the Introduction to the series.

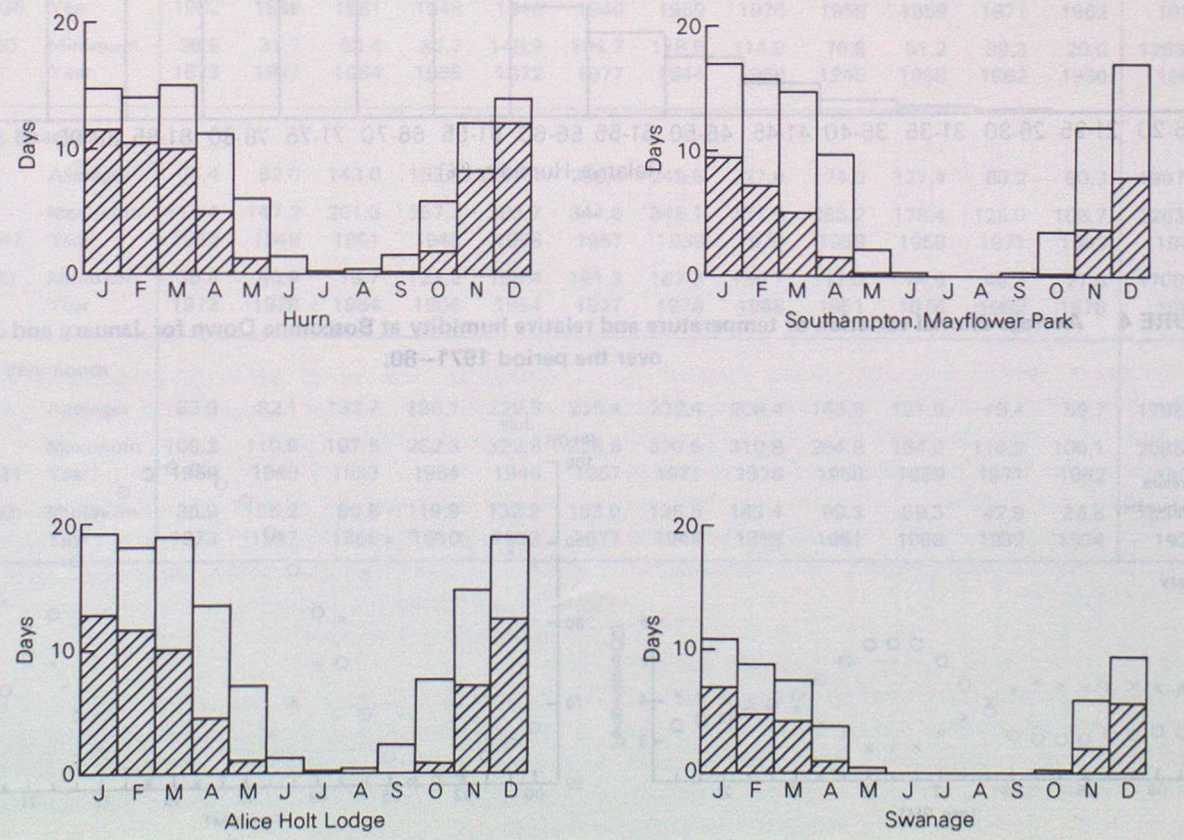
Table 2 gives the average number of days temperatures exceeded certain limits at five locations in South England. Shanklin, because of the modifying influence of the sea, has fewer occasions of both high and low temperatures than the four inland locations.

TABLE 2 **Average number of days (1961–80) with maximum and minimum temperatures exceeding the specified limits at selected sites**

Maximum temperature	25.0 °C or more					30.0 °C or more		
	May	Jun	Jul	Aug	Sep	Jun	Jul	Aug
Lacock	0.2	2.0	2.3	2.3	0.3	0.2	0.1	0.3
Larkhill	0.3	2.1	2.9	2.9	0.3	0.3	0.4	0.2
Long Sutton	0.3	1.7	3.0	2.5	0.5	0.3	0.4	0.1
Leckford	0.2	1.5	3.5	3.5	0.5	0.2	0.4	0.2
Shanklin		0.7	1.1	0.9		0.1	0.1	

Minimum temperature	Less than −5.0 °C						Less than −10.0 °C				
	Nov	Dec	Jan	Feb	Mar	Apr	Nov	Dec	Jan	Feb	Mar
Lacock	1.5	3.3	4.2	2.3	1.9	0.3	0.1	0.1	1.3	0.1	0.1
Larkhill	0.3	2.1	3.3	2.1	0.9	0.1		0.1	0.5		
Long Sutton	0.3	2.5	2.6	1.9	0.8				0.6	0.1	
Leckford	0.1	2.1	2.9	1.3	0.8	0.1		0.1	0.5		
Shanklin		0.5	1.1	0.3	0.3						

FIGURE 2 **Average number of days with air frost (hatched areas) and ground frost (whole columns) over the period 1961–80.**



HUMIDITY

Relative humidity is a measure of the amount of water vapour in the air compared with the maximum amount which could be contained by the air at the same temperature, expressed as a percentage. If the amount of water vapour in the air remains constant then as the temperature rises (or falls) the relative humidity decreases (or increases).

Relative humidity averages about 85 per cent over the year with higher values occurring in the winter and by night. This is primarily a reflection of the seasonal and diurnal temperature changes. Relative humidity equals or exceeds 95 per cent for some 25 per cent of the time in the area, and 100 per cent can be reached in fog and persistent rain, snow or drizzle. Low relative humidities are less common as Figure 3 shows. This gives the percentage of time in the period 1971–80 that relative humidities in the stated 5 per cent ranges occurred at Hurn. The range 16–20 per cent represents just one hour in the ten-year period.

Figure 4 shows the diurnal variation of relative humidity and temperature at Boscombe Down for the months of January and July over the period 1971–80; this illustrates a number of points made in the text.

FIGURE 3 Percentage of time relative humidity occurred in the ranges specified at Bournemouth/Hurn during the period 1971–80.

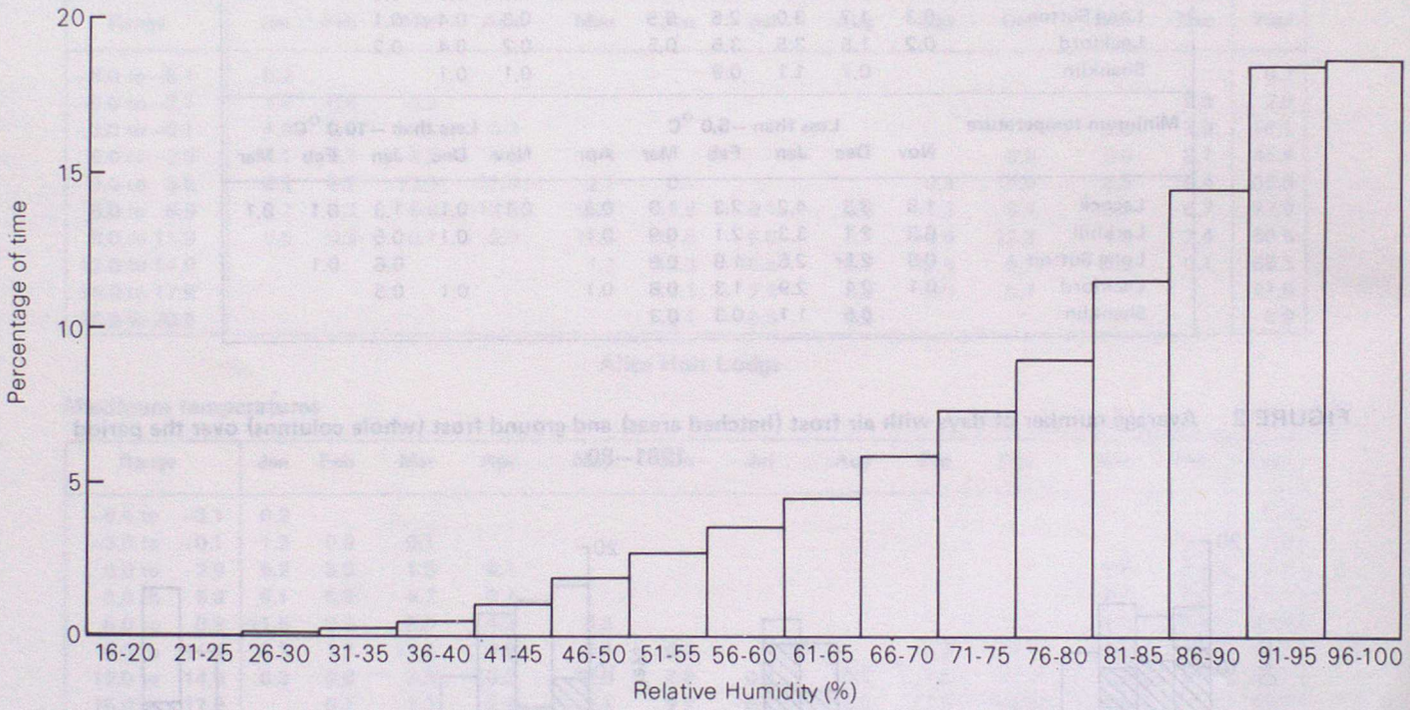
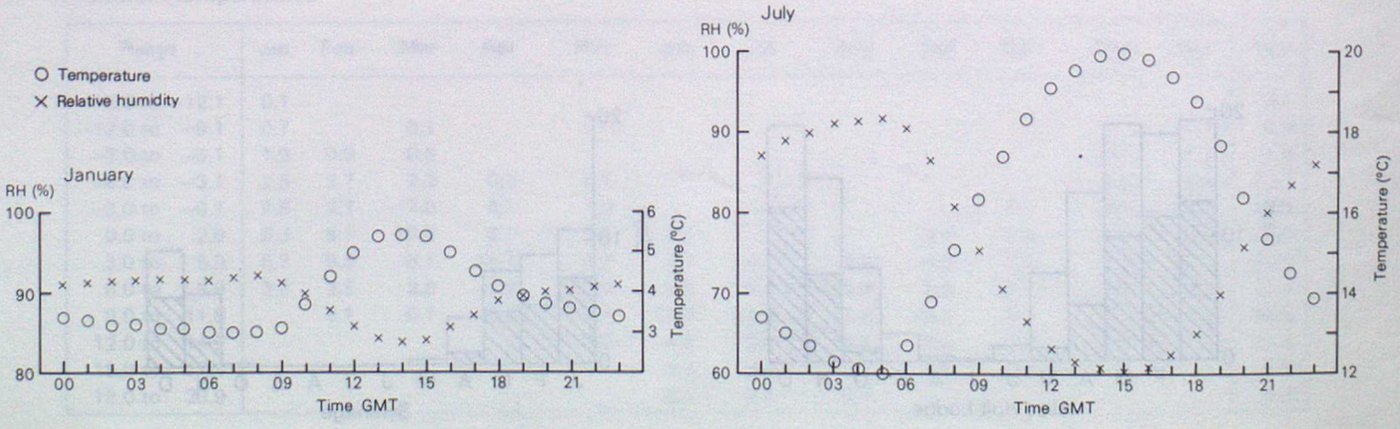


FIGURE 4 Average diurnal variation of temperature and relative humidity at Boscombe Down for January and July over the period 1971–80.



SUNSHINE

The variation in length of day throughout the year means that the duration of sunshine shows a marked annual variation. On average December is the month with least sunshine and June the sunniest. In general sunshine duration decreases with increasing altitude and increasing latitude though aspect plays an important role, for example, the difference between north and south facing locations. Industrial pollution and smoke haze can reduce sunshine amounts.

Average annual sunshine totals over the area vary from a maximum of about 1900 hours at Shanklin, Isle of Wight to a minimum of around 1500 hours at Leckford, Hampshire. The sunniest place in Great Britain is St Helier, Jersey with an annual average over the period 1951–80 of 1928 hours, and the least sunniest Shetland with less than 1100 hours.

After the Channel Islands, resorts on the Isle of Wight are on average the sunniest places in the country.

Table 3 lists the average monthly and annual sunshine totals for four locations in South England for the period 1951–80 plus extreme values for periods up to 1980. The 2263.1 hours recorded at Shanklin in 1949 has only been exceeded by locations in the Channel Islands.

Table 4 gives the average number of days each month in the period 1961–80 that sunshine durations occurred in the ranges specified at four locations in the area. It can be seen that the two coastal locations have more sunnier days throughout the year than the two inland sites.

TABLE 3 Average monthly and annual totals of duration (hours) of bright sunshine at selected sites over the period 1951–80 together with extreme values for the stated years

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Southampton														
	Averages	56.3	71.6	122.6	165.7	212.5	214.9	207.4	190.9	152.4	112.5	73.1	52.9	1632.8
	Maximum	98.0	123.8	188.7	225.3	267.6	321.8	301.7	311.8	246.5	161.5	101.2	79.1	2055.5
1931	Year	1959	1949	1933	1949	1956	1975	1949	1976	1959	1959	1971	1980	1949
–80	Minimum	28.6	29.0	66.7	90.5	109.4	136.3	119.2	135.8	87.9	60.8	36.9	22.9	1279.0
	Year	1936	1940	1964	1966	1932	1977	1944	1968	1945	1976	1934	1956	1932
Leckford														
	Averages	50.8	68.1	112.4	152.9	197.0	185.7	191.2	176.5	140.8	104.3	69.8	49.3	1498.8
	Maximum	94.9	124.0	175.1	227.6	277.1	284.8	267.5	282.2	237.0	154.6	97.4	98.9	1872.7
1936	Year	1952	1949	1961	1948	1948	1940	1959	1976	1959	1959	1971	1962	1959
–80	Minimum	28.5	31.7	55.4	82.7	145.9	104.7	118.5	114.9	70.8	51.2	39.3	20.0	1293.7
	Year	1973	1947	1964	1966	1972	1977	1944	1968	1945	1968	1962	1956	1958
Shanklin														
	Averages	65.4	82.0	143.0	192.4	247.1	258.4	249.6	227.4	174.5	127.4	80.2	60.3	1907.6
	Maximum	111.4	147.2	201.3	257.2	303.7	344.0	345.1	331.9	266.2	178.4	125.0	108.7	2263.1
1947	Year	1952	1949	1961	1948	1956	1957	1959	1976	1959	1959	1971	1962	1949
–80	Minimum	35.4	40.9	78.7	123.2	195.4	161.3	167.3	156.7	117.0	74.5	46.2	27.8	1700.5
	Year	1973	1976	1964	1966	1954	1977	1978	1968	1951	1976	1962	1978	1958
Weymouth														
	Averages	63.9	82.1	133.7	186.1	229.9	235.4	232.4	208.4	165.5	121.9	79.4	59.7	1798.5
	Maximum	106.3	110.9	197.5	262.3	322.6	325.8	320.6	310.8	254.8	164.0	114.2	100.1	2085.2
1931	Year	1959	1949	1933	1954	1948	1957	1971	1976	1959	1959	1971	1962	1959
–80	Minimum	35.9	35.2	80.8	119.9	132.2	153.0	135.5	143.4	99.3	69.3	42.9	35.8	1554.4
	Year	1973	1947	1969	1940	1932	1977	1944	1958	1951	1968	1932	1934	1932

TABLE 4 Average number of days of sunshine duration at selected sites over the period 1971–80

(Frequency of occurrence in 3–hour ranges for each month and for the year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Boscombe Down													
Nil	13.5	9.3	6.0	3.1	2.0	2.1	1.9	1.9	2.5	6.3	9.7	12.9	71.3
0.1 to 3.0	10.2	9.5	8.9	7.9	6.5	6.4	6.6	7.7	8.3	9.5	9.5	10.1	101.1
3.1 to 6.0	5.1	5.1	6.8	6.7	5.9	5.0	6.8	6.9	7.0	7.7	5.6	6.1	74.7
6.1 to 9.0	2.3	3.9	5.9	5.7	6.9	5.3	5.7	5.7	7.5	5.9	5.2	1.9	62.0
9.1 to 12.0		0.4	3.5	4.9	5.3	5.3	5.7	6.3	4.6	1.5			37.3
12.1 or more				1.5	4.4	6.0	4.3	2.6	0.1				18.9
Swanage													
Nil	13.5	9.8	5.7	3.3	2.3	2.3	1.1	1.7	2.8	6.9	9.9	13.6	73.3
0.1 to 3.0	9.3	8.1	7.8	6.3	4.9	4.7	5.1	6.1	7.1	8.8	8.4	8.1	84.6
3.1 to 6.0	5.5	5.1	6.7	5.9	5.1	4.0	5.3	5.1	5.7	5.5	6.5	7.0	67.4
6.1 to 9.0	2.8	4.5	6.7	6.1	6.5	4.6	6.4	6.5	7.4	8.4	5.2	2.2	67.3
9.1 to 12.0		0.6	4.1	6.8	6.0	6.3	6.1	7.6	6.9	1.4			45.6
12.1 or more				1.7	6.3	8.1	6.9	3.9	0.2				27.1
Ryde													
Nil	11.9	9.3	5.4	3.2	1.9	1.7	1.1	1.7	2.7	5.2	9.0	12.1	65.2
0.1 to 3.0	10.7	8.7	8.1	7.1	5.7	5.3	5.8	6.5	7.0	9.7	9.3	10.3	94.3
3.1 to 6.0	5.9	5.3	6.7	6.0	4.9	4.1	6.1	5.5	6.7	6.8	6.5	6.6	71.3
6.1 to 9.0	2.5	4.5	7.1	6.6	6.7	4.9	6.6	6.8	6.9	7.5	5.1	2.0	67.3
9.1 to 12.0		0.5	3.5	6.1	6.3	6.4	6.3	7.5	6.6	1.8			45.1
12.1 or more				1.1	5.5	7.5	4.9	2.9	0.1				22.0
Leckford													
Nil	13.9	10.1	6.5	3.4	2.3	2.9	2.1	2.0	3.3	6.9	9.5	13.4	76.5
0.1 to 3.0	9.9	8.7	8.5	8.1	6.3	6.2	7.0	7.9	7.7	9.2	10.0	9.8	99.3
3.1 to 6.0	5.3	5.7	7.2	7.4	6.7	5.7	7.3	6.9	7.0	7.9	6.3	6.9	80.1
6.1 to 9.0	1.8	3.7	6.4	5.7	6.7	6.1	5.8	6.5	7.8	6.5	4.1	0.9	61.9
9.1 to 12.0		0.1	2.3	4.8	5.6	6.4	6.4	6.4	4.2	0.5			36.8
12.1 or more				0.7	3.5	2.8	2.5	1.3	0.1				10.7

RAINFALL

The distribution of rainfall over the United Kingdom is very much influenced by topography with the largest values occurring over the more mountainous regions and the smallest values in the lower lying areas. In this text rainfall also includes snow, sleet and hail as well as the small amounts from dew, hoar frost and rime. The map shows the annual average rainfall over South England; the influence of topography is clearly seen.

The nature of rainfall varies during the year. In summer rainfall is often of a showery nature falling over short periods and is normally more intense than winter rainfall which tends to be more frontal in character with falls occurring over longer periods. As a rough guide an average day of steady rain gives 10 to 15 millimetres and a heavy thunderstorm lasting an hour or so 25 to 50 millimetres. Twenty-five millimetres of rainfall are equivalent to about 200 tonnes of water on a football pitch.

Figure 5 shows the monthly variation of rainfall for six locations in South England. The pattern of rainfall is the same at each with the months November, December and January being the wettest and the drier months occurring in the spring or summer.

Rainfall is extremely variable as the data in Table 5 show. This gives the highest and lowest monthly and annual totals recorded at five locations in the area for periods ending in 1981. The 1941–70 averages are given for comparison.

Average annual rainfall (mm) over the period 1941–70
Co-ordinates are national grid references

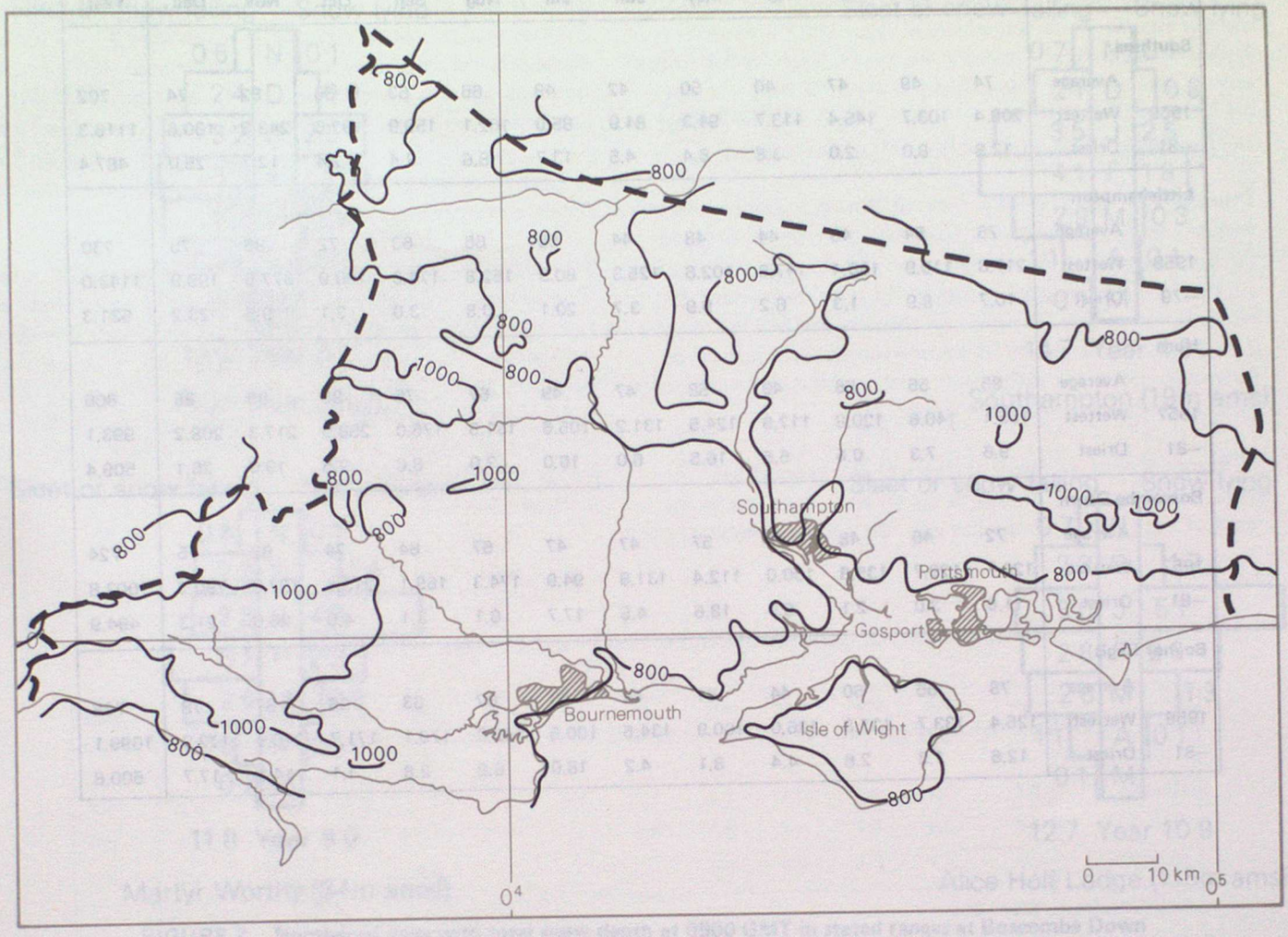
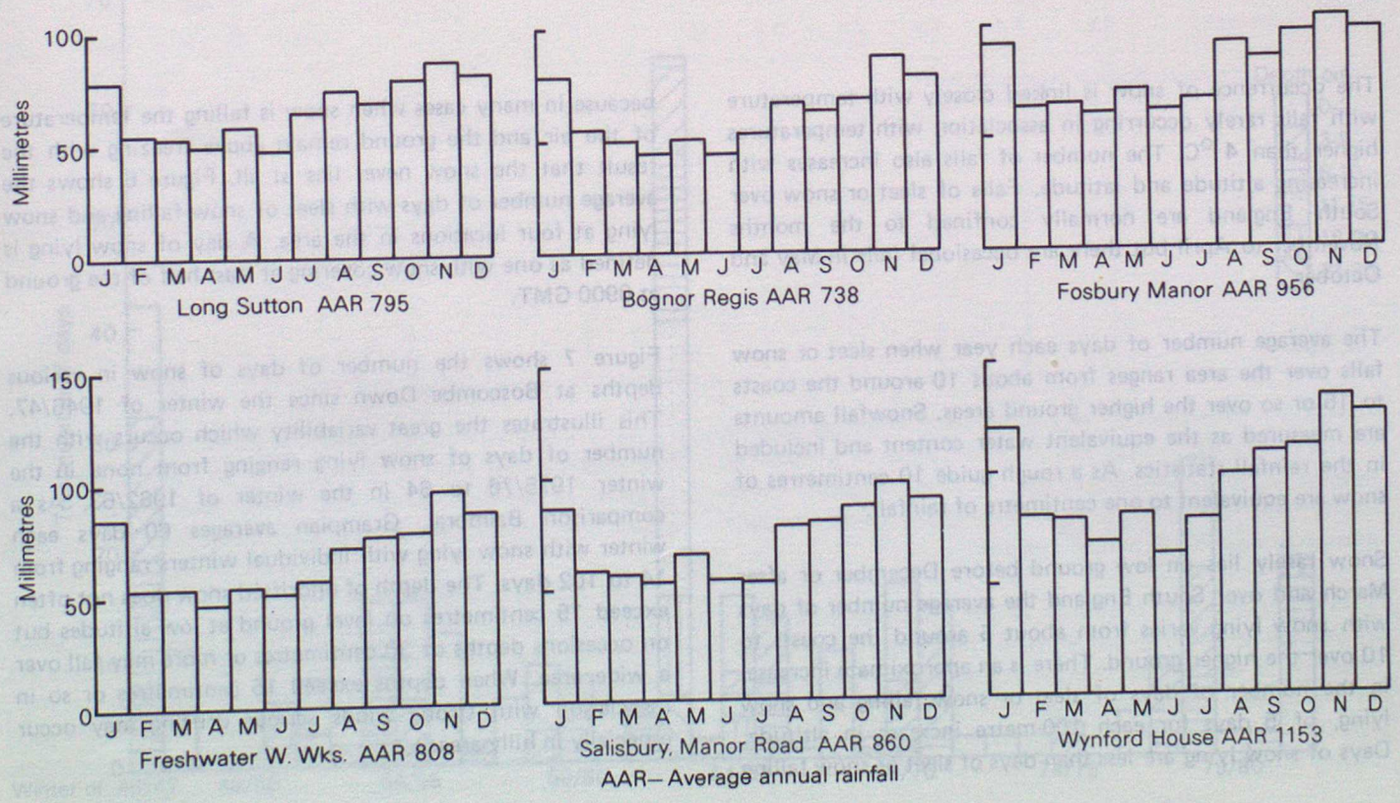


FIGURE 5 Average monthly rainfall (millimetres) over the period 1941–70.



AAR– Average annual rainfall

TABLE 5 Rainfall (millimetres) averages for 1941–70 and extremes for the specified periods

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Southsea														
	Average	74	49	47	40	50	42	49	66	63	66	82	74	702
1959	Wettest	208.4	103.7	145.4	113.7	94.3	84.9	85.0	162.1	159.9	192.6	243.8	180.6	1116.3
–81	Driest	12.8	8.0	2.0	3.8	6.4	4.5	13.7	8.6	3.4	2.4	12.7	25.0	487.4
Littlehampton														
	Average	76	54	48	44	48	44	55	65	63	72	86	75	730
1959	Wettest	217.8	110.9	130.4	147.6	102.6	125.3	80.9	152.8	174.3	190.9	377.5	199.9	1143.0
–79	Driest	10.7	8.9	1.3	6.2	9.9	3.7	20.1	0.8	3.0	3.1	9.5	23.2	531.3
Hurn														
	Average	85	55	56	49	58	47	49	67	75	85	95	85	806
1957	Wettest	155.1	140.6	120.8	117.9	124.5	131.2	105.6	131.5	176.0	258.9	217.3	208.2	993.1
–81	Driest	9.6	7.3	0.5	5.5	16.5	6.0	10.0	7.0	8.6	2.5	19.0	25.1	509.4
Boscombe Down														
	Average	72	46	48	45	57	47	47	67	64	74	82	75	724
1957	Wettest	128.7	129.7	135.8	100.0	112.4	131.8	94.9	174.3	165.1	213.5	187.8	190.2	1003.8
–81	Driest	11.6	3.0	2.1	6.9	18.6	4.5	17.7	6.1	3.1	4.0	26.0	21.3	494.9
Bognor Regis														
	Average	78	55	50	44	51	44	53	67	63	68	87	78	738
1959	Wettest	125.4	133.7	137.8	136.0	100.9	134.5	100.5	142.9	170.1	171.7	210.9	172.2	1099.1
–81	Driest	12.6	1.3	2.6	4.4	8.1	4.2	18.0	6.8	2.8	1.1	14.1	17.7	500.8

SNOW

The occurrence of snow is linked closely with temperature with falls rarely occurring in association with temperatures higher than 4 °C. The number of falls also increases with increasing altitude and latitude. Falls of sleet or snow over South England are normally confined to the months November to April but there are occasional falls in May and October.

The average number of days each year when sleet or snow falls over the area ranges from about 10 around the coasts to 15 or so over the higher ground areas. Snowfall amounts are measured as the equivalent water content and included in the rainfall statistics. As a rough guide 10 centimetres of snow are equivalent to one centimetre of rainfall.

Snow rarely lies on low ground before December or after March and over South England the average number of days with snow lying varies from about 5 around the coasts to 10 over the higher ground. There is an approximate increase, in the number of days of sleet or snow falling and snow lying, of 5 days for each 100-metre increase in altitude. Days of snow lying are less than days of sleet or snow falling because in many cases when snow is falling the temperature of the air and the ground remain above freezing with the result that the snow never lies at all. Figure 6 shows the average number of days with sleet or snow falling and snow lying at four locations in the area. A day of snow lying is defined as one with snow covering at least half of the ground at 0900 GMT.

Figure 7 shows the number of days of snow in various depths at Boscombe Down since the winter of 1946/47. This illustrates the great variability which occurs with the number of days of snow lying ranging from none in the winter 1975/76 to 64 in the winter of 1962/63. As a comparison Balmoral, Grampian averages 60 days each winter with snow lying with individual winters ranging from 14 to 102 days. The depth of undrifted snow does not often exceed 15 centimetres on level ground at low altitudes but on occasions depths of 30 centimetres or more may fall over a wide area. When depths exceed 15 centimetres or so in association with strong winds serious drifting may occur especially in hilly areas.

FIGURE 6 Average number of days per month with snow/sleet falling and snow lying at selected sites at 0900 GMT over the period 1961–80

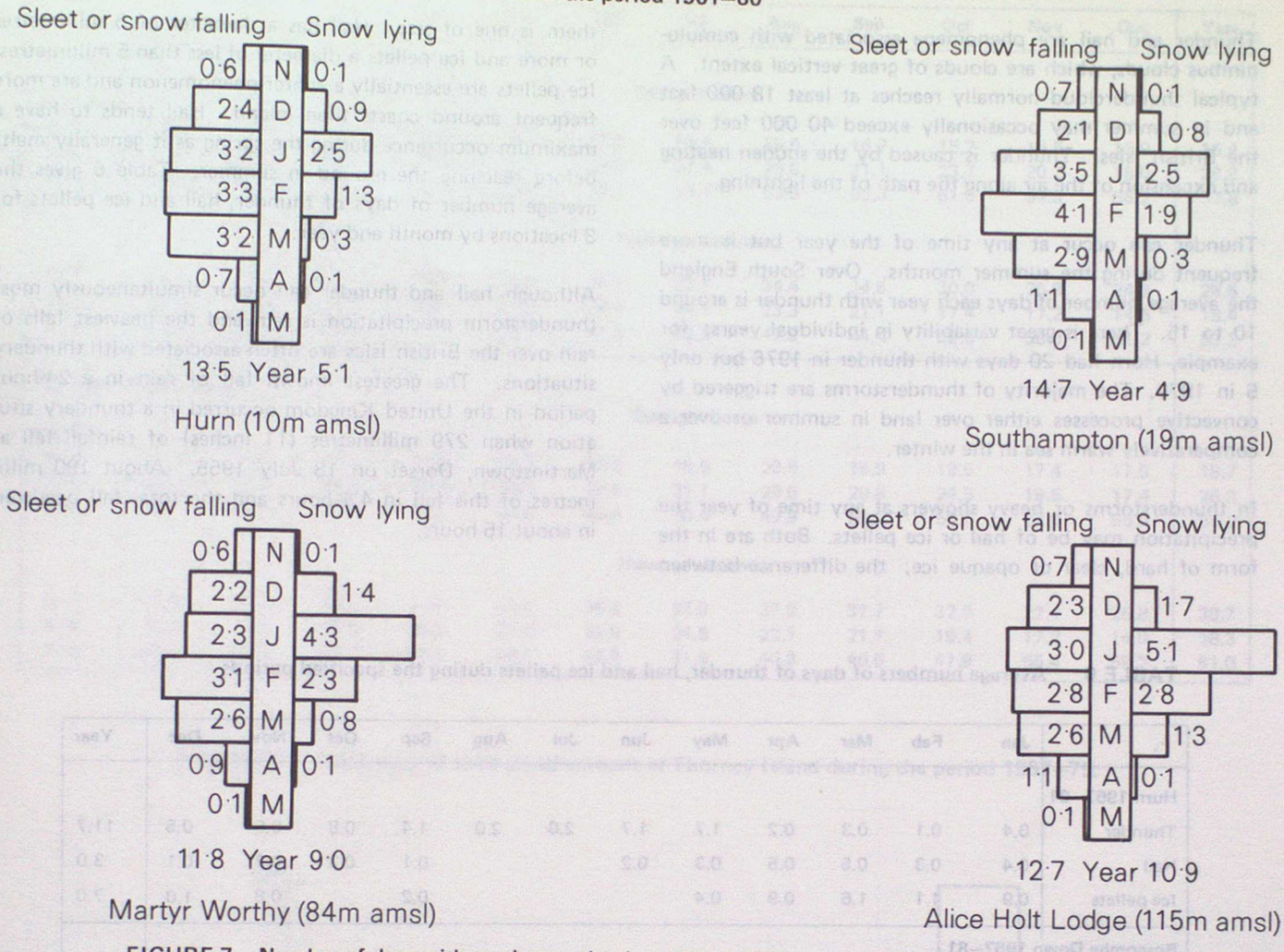
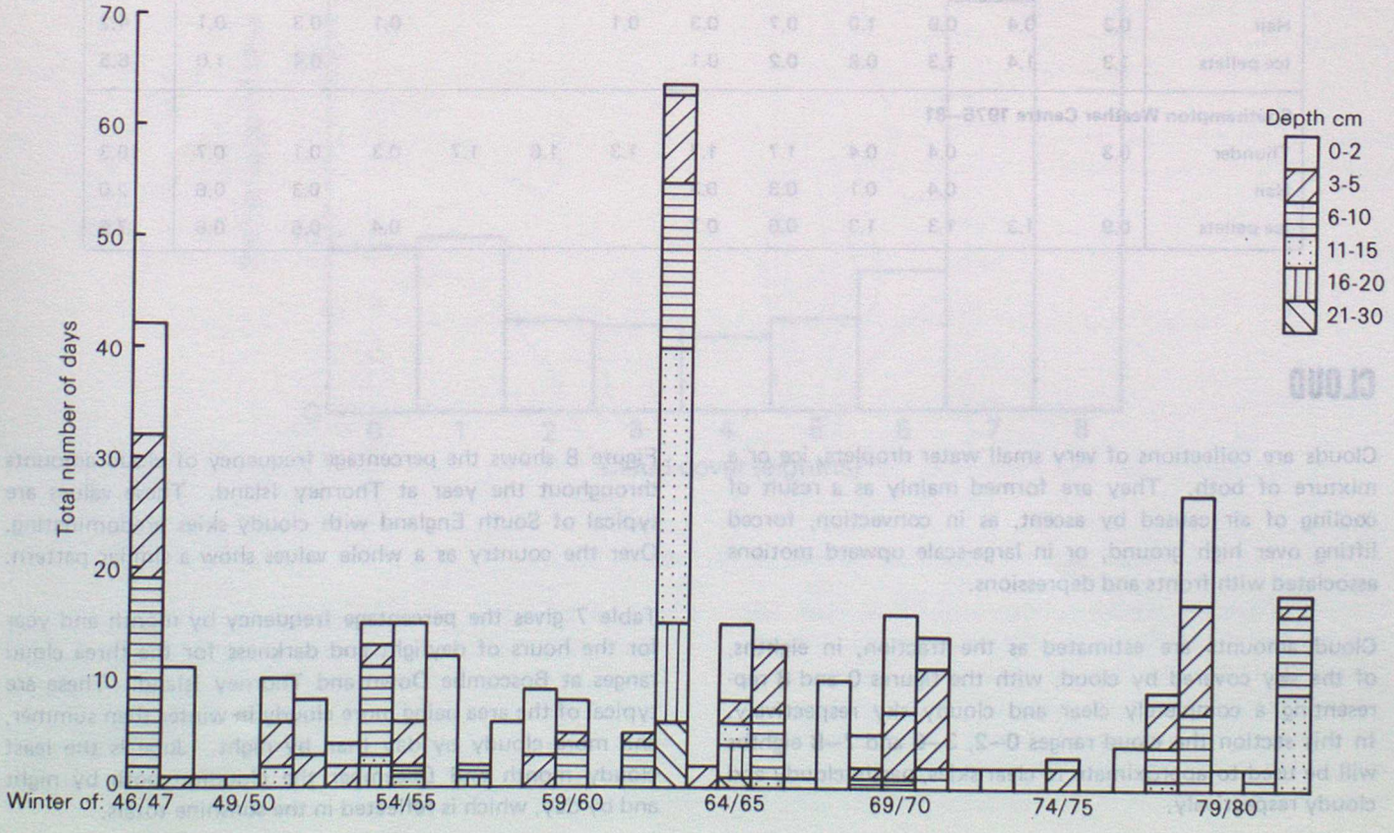


FIGURE 7 Number of days with total snow depth at 0900 GMT in stated ranges at Boscombe Down



THUNDER AND HAIL

Thunder and hail are phenomena associated with cumulonimbus clouds, which are clouds of great vertical extent. A typical thundercloud normally reaches at least 18 000 feet and in summer may occasionally exceed 40 000 feet over the British Isles. Thunder is caused by the sudden heating and expansion of the air along the path of the lightning.

Thunder can occur at any time of the year but is more frequent during the summer months. Over South England the average number of days each year with thunder is around 10 to 15. There is great variability in individual years; for example, Hurn had 20 days with thunder in 1976 but only 5 in 1979. The majority of thunderstorms are triggered by convective processes either over land in summer or over a comparatively warm sea in the winter.

In thunderstorms or heavy showers at any time of year the precipitation may be of hail or ice pellets. Both are in the form of hard, clear or opaque ice; the difference between them is one of size. Hail has a diameter of 5 millimetres or more and ice pellets a diameter of less than 5 millimetres. Ice pellets are essentially a winter phenomenon and are more frequent around coasts than inland. Hail tends to have a maximum occurrence during the spring as it generally melts before reaching the ground in summer. Table 6 gives the average number of days of thunder, hail and ice pellets for 3 locations by month and year.

Although hail and thunder can occur simultaneously most thunderstorm precipitation is rain and the heaviest falls of rain over the British Isles are often associated with thundery situations. The greatest known fall of rain in a 24-hour period in the United Kingdom occurred in a thundery situation when 279 millimetres (11 inches) of rainfall fell at Martinstown, Dorset on 18 July 1955. About 190 millimetres of this fell in 4½ hours and the total fall occurred in about 15 hours.

TABLE 6 Average numbers of days of thunder, hail and ice pellets during the specified periods

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Hurn 1957–81													
Thunder	0.4	0.1	0.3	0.2	1.7	1.7	2.0	2.0	1.4	0.8	0.5	0.5	11.7
Hail	0.4	0.3	0.5	0.5	0.3	0.2			0.1	0.3	0.3	0.1	3.0
Ice pellets	0.9	1.1	1.6	0.9	0.4				0.2		0.8	1.0	7.0
Boscombe Down 1957–81													
Thunder	0.2		0.2	0.5	1.4	2.0	2.1	1.9	1.1	0.5	0.3	0.3	10.5
Hail	0.3	0.4	0.9	1.0	0.7	0.3	0.1			0.1	0.3	0.1	4.2
Ice pellets	1.3	1.4	1.3	0.8	0.2	0.1					0.4	1.0	6.5
Southampton Weather Centre 1975–81													
Thunder	0.3		0.4	0.4	1.7	1.7	1.3	1.6	1.7	0.3	0.1	0.7	10.3
Hail			0.4	0.1	0.3	0.3					0.3	0.6	2.0
Ice pellets	0.9	1.3	1.3	1.3	0.6	0.7				0.4	0.6	0.6	7.6

CLOUD

Clouds are collections of very small water droplets, ice or a mixture of both. They are formed mainly as a result of cooling of air caused by ascent, as in convection, forced lifting over high ground, or in large-scale upward motions associated with fronts and depressions.

Cloud amounts are estimated as the fraction, in eighths, of the sky covered by cloud, with the figures 0 and 8 representing a completely clear and cloudy sky respectively. In this section the cloud ranges 0–2, 3–6 and 7–8 eighths will be used to approximate to clear skies, partly cloudy and cloudy respectively.

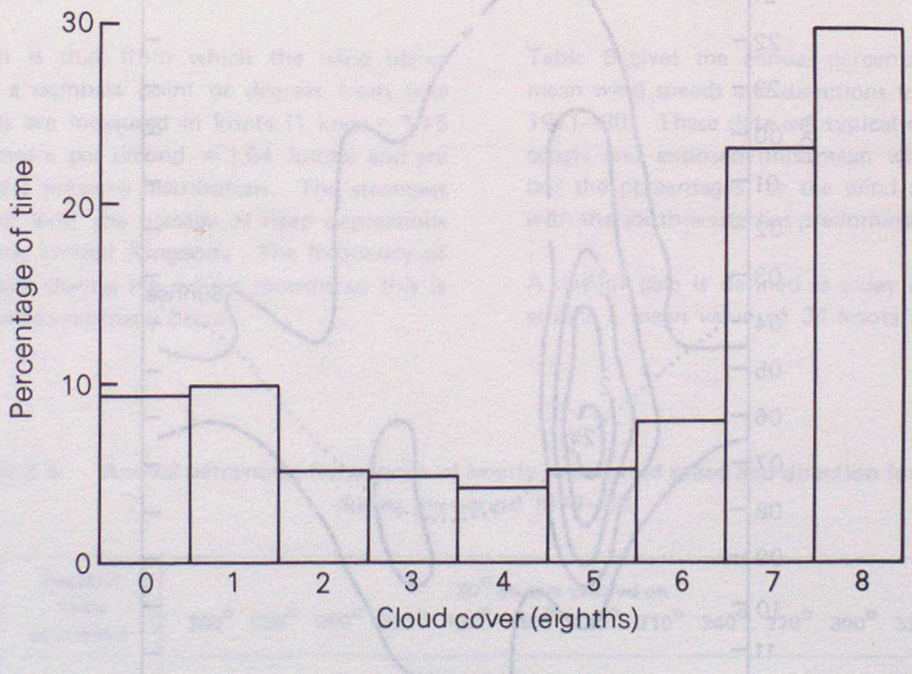
Figure 8 shows the percentage frequency of cloud amounts throughout the year at Thorney Island. These values are typical of South England with cloudy skies predominating. Over the country as a whole values show a similar pattern.

Table 7 gives the percentage frequency by month and year for the hours of daylight and darkness for the three cloud ranges at Boscombe Down and Thorney Island. These are typical of the area being more cloudy in winter than summer, and more cloudy by day than by night. June is the least cloudy month and December the cloudiest both by night and by day, which is reflected in the sunshine totals.

TABLE 7 Percentage frequency of hours with total cloud amount in selected ranges over the period 1957–76

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Boscombe Down													
						Daylight hours							
Eighths													
0–2	11.8	12.4	15.3	14.8	14.1	18.8	15.4	16.6	16.7	15.2	15.5	15.9	15.4
3–6	16.3	19.1	23.9	28.0	31.9	32.6	31.4	29.6	31.1	23.7	20.2	18.0	26.8
7–8	72.0	68.6	60.7	57.2	54.0	48.7	53.1	53.9	52.3	61.0	64.3	66.2	57.8
						Hours of darkness							
0–2	19.8	24.0	28.9	32.1	31.9	34.7	33.1	34.4	34.6	30.0	25.8	24.3	28.5
3–6	14.0	14.3	17.6	20.5	21.9	23.4	24.1	23.3	21.1	17.4	17.2	14.6	18.4
7–8	66.2	61.7	53.5	47.3	46.1	41.8	42.6	42.2	44.4	52.6	56.9	61.2	53.3
Thorney Island/Tangmere													
						Daylight hours							
Eighths													
0–2	14.3	15.3	18.0	17.0	18.3	23.0	18.5	20.5	19.9	19.5	17.4	17.5	18.7
3–6	16.0	19.1	24.3	27.4	30.1	30.6	31.1	29.5	29.8	24.5	19.5	17.4	26.3
7–8	69.7	65.6	57.6	55.6	51.5	46.4	50.4	49.9	50.2	56.1	63.0	65.0	55.2
						Hours of darkness							
0–2	23.6	25.3	30.8	33.4	33.0	36.3	33.9	37.2	37.7	32.5	27.4	26.8	30.7
3–6	12.9	13.9	16.9	20.3	22.5	23.9	24.5	22.7	21.7	19.4	17.2	14.0	18.3
7–8	63.4	60.8	52.2	46.3	44.4	39.9	41.6	40.3	40.6	47.9	55.4	59.2	51.0

FIGURE 8 Frequency of total cloud amount at Thorney Island during the period 1957–75.



VISIBILITY

Visibility is defined as the greatest horizontal distance at which an object can be discerned with the naked eye. It is of considerable importance to the community in general because the operation of various types of transport may be disrupted or stopped altogether if the visibility falls below certain limits. Variations in visibility occur with the different types of precipitation such as rain, drizzle and snow, as well as atmospheric pollution due to smoke and dust, but the really poor visibilities are due mainly to fog.

Fog is predominantly a winter phenomenon occurring generally at night or early morning though it does occasionally persist all day. There are a number of factors which affect fog formation and as a consequence there is a wide variation in the number of occasions when fog occurred at locations throughout the area. Fog and fog formation processes are discussed in the Introduction to the series.

FIGURE 9 Average number of hours of thick fog at Boscombe Down during the period 1961–80.

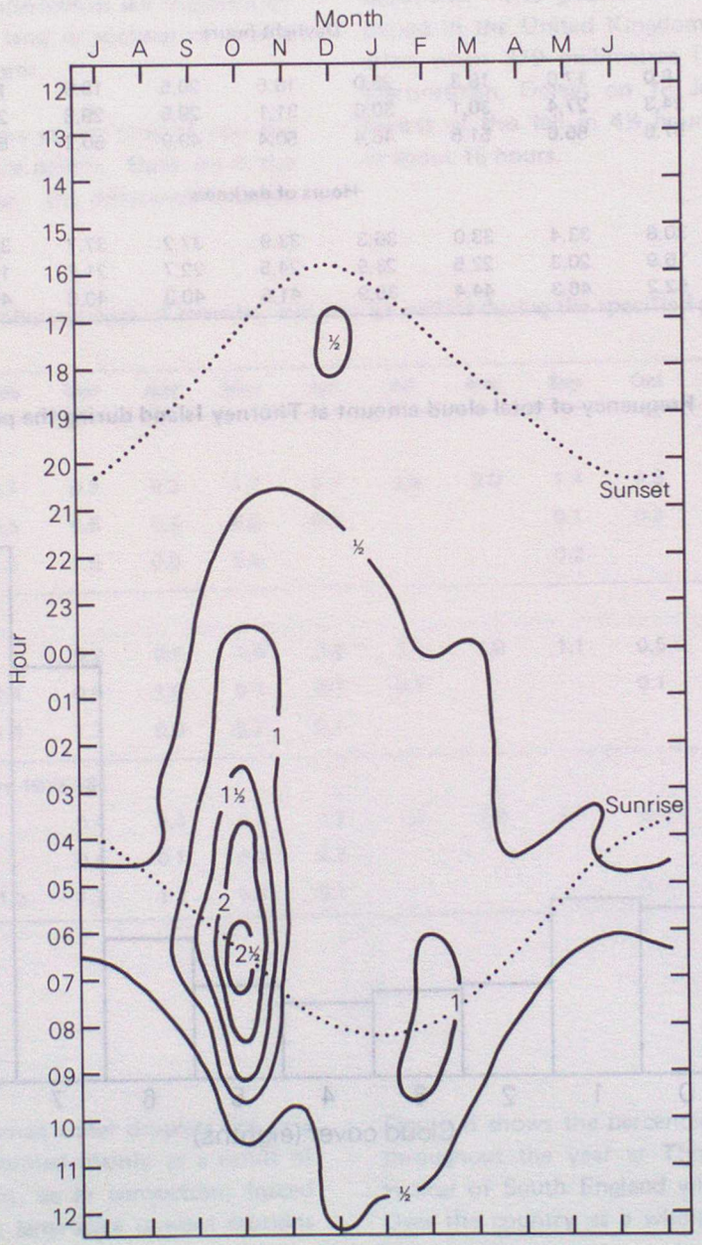
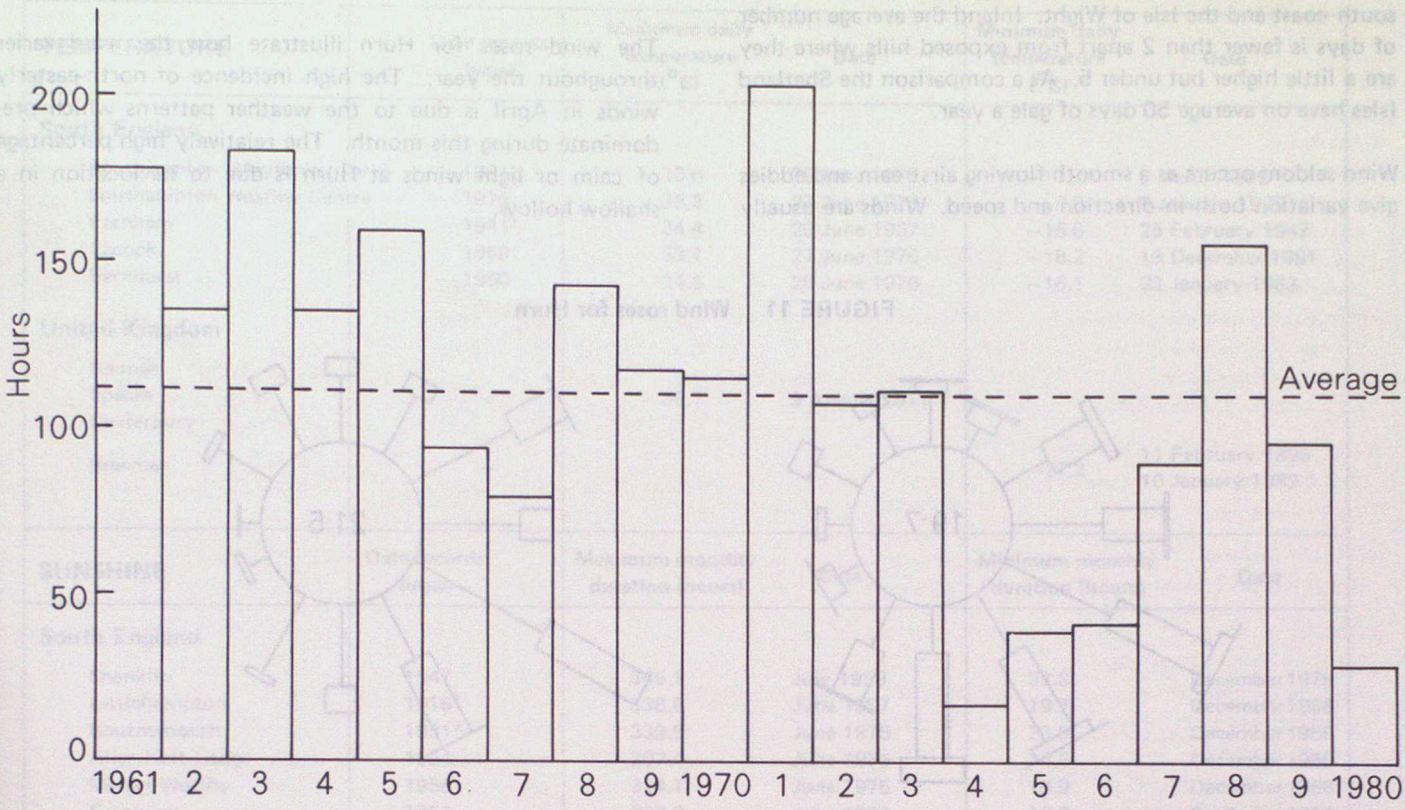


Figure 9 shows the average number of hours of thick fog, visibility less than 200 metres, at Boscombe Down over the period 1961–80. The foggiest time is around the dawn period in October with on average 2½ hours of thick fog. Other inland locations would show a similar pattern but around the coasts advection fogs are more frequent and these are most common in the late spring or early summer.

Like all elements of the weather the occurrence of fog is extremely variable; for example, in October 1965 Boscombe Down had 59 hours of thick fog but none in October 1967. Figure 10 gives the number of hours for the years 1961–80 when thick fog occurred at Boscombe Down. These are the same data as in Figure 9 but presented in a different format.

FIGURE 10 Number of hours of thick fog at Boscombe Down during the period 1961–80



WIND

The wind direction is that from which the wind blows recorded either as a compass point or degrees from true north. Wind speeds are measured in knots (1 knot = 1.15 miles per hour, 1 metre per second = 1.94 knots) and are closely related to the pressure distribution. The strongest winds are associated with the passage of deep depressions across or close to the United Kingdom. The frequency of depressions is greatest during the winter months so this is when the strongest winds normally occur.

Table 8 gives the annual percentage frequency of hourly mean wind speeds and directions for Larkhill for the period 1971–80. These data are typical of the area, though along coasts and exposed hills mean wind speeds will be higher but the percentages for the wind directions will be similar with the south-westerlies predominating.

A day of gale is defined as a day on which the wind speed attains a mean value of 34 knots or more over any period

TABLE 8 Annual percentage frequencies of hourly mean wind speed and direction for Larkhill during the period 1970–80

Knots	Beaufort force equivalent	30° sectors centred on												All directions
		360°	030°	060°	090°	120°	150°	180°	210°	240°	270°	300°	330°	
Calm	0													1.0
1–3	1	0.6	0.9	0.9	0.8	0.7	0.8	1.1	1.5	1.1	0.7	0.5	0.5	14.1
4–10	2–3	3.5	4.3	2.9	2.7	2.4	2.8	3.9	7.3	7.7	5.9	4.0	3.6	51.2
11–21	4–5	2.0	4.4	2.9	1.5	0.8	0.8	2.0	5.7	5.0	4.2	1.2	1.0	31.4
22–33	6–7	0.1	0.3	0.2	0.1	+	+	0.1	0.4	0.2	0.3	+	+	1.7
≥34	≥8								+	+	+			+
Total ≥4	≥2	5.7	9.0	5.9	4.1	3.4	3.6	5.9	13.4	12.9	10.4	5.3	4.7	84.4
													Missing data	0.6

+ Observations in these categories but for less than 0.05 per cent of the time

of ten consecutive minutes. Over South England the average number of days of gale each year is about 5 to 10 along the south coast and the Isle of Wight. Inland the average number of days is fewer than 2 apart from exposed hills where they are a little higher but under 5. As a comparison the Shetland Isles have on average 50 days of gale a year.

Wind seldom occurs as a smooth flowing airstream and eddies give variation both in direction and speed. Winds are usually stronger by day as a temperature rise increases turbulence making average speeds higher and the wind more gusty.

The wind roses for Hurn illustrate how the wind varies throughout the year. The high incidence of north-easterly winds in April is due to the weather patterns which predominate during this month. The relatively high percentage of calm or light winds at Hurn is due to its location in a shallow hollow.

FIGURE 11 **Wind roses for Hurn**

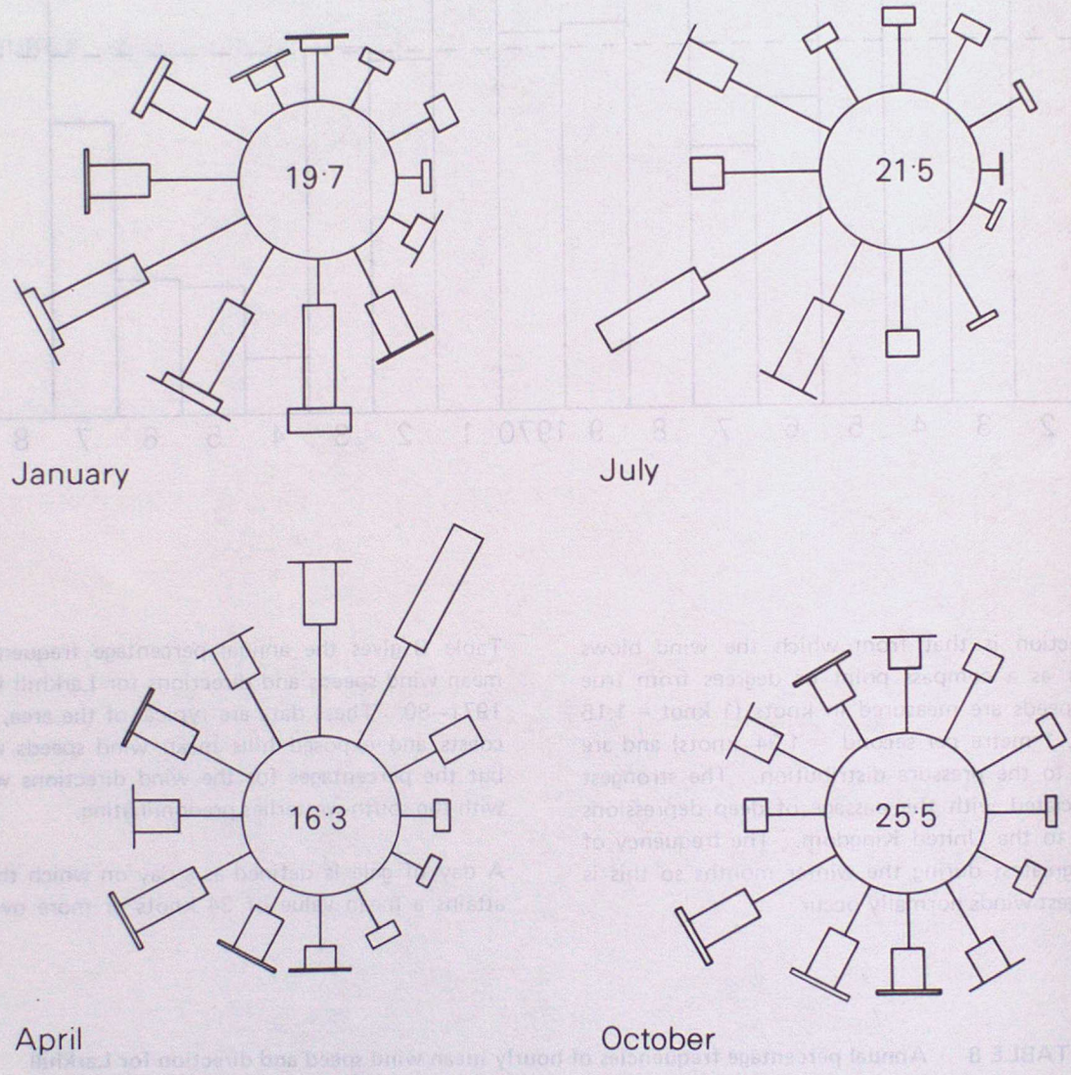


TABLE 9 Weather extremes

TEMPERATURE	Date records began	Maximum daily temperature (°C)	Date	Minimum daily temperature (°C)	Date
South England					
Southampton (Mayflower Park)	1901	35.6	28 June 1976	−11.7	3 March 1909
Southampton Weather Centre	1975	35.3	27 June 1976	−8.0	2 January 1979
Farnham	1941[1]	34.4	29 June 1957	−15.6	25 February 1947
Lacock	1950	33.1	27 June 1976	−18.2	13 December 1981
Fernhurst	1950	34.5	26 June 1976	−16.1	23 January 1963
United Kingdom					
Raunds					
Epsom	–	36.7	9 August 1911		
Canterbury					
Braemar	–			−27.2	11 February 1895 10 January 1982

SUNSHINE	Date records began	Maximum monthly duration (hours)	Date	Minimum monthly duration (hours)	Date
South England					
Shanklin	1947	345.1	July 1959	27.8	December 1978
Littlehampton	1916[2]	338.6	June 1957	19.7	December 1956
Bournemouth	1931[3]	338.5	June 1975	23.0	December 1956
Alice Holt Lodge	1954	307.4	June 1975	14.5	December 1956
Martyr Worthy	1956	314.1	June 1975	16.9	December 1956
Fernhurst	1951	292.8	June 1957	17.6	December 1956
United Kingdom					
Eastbourne	–	383.9	July 1911		
London (Westminster)	–			0	December 1890

WIND	Date records began	Maximum mean wind speed (knots)	Date	Maximum gust speed (knots)	Date
South England					
Portland Bill LH	1964[4]	65	27 October 1967	89	2 January 1966
Lee on Solent	1973	48	15 December 1979	70	15 December 1979
Calshot	1920[5]	46	11 February 1974	76	11 January 1974
Boscombe Down	1933	44	27 March 1976	75	16 March 1947
United Kingdom (Low-level sites)					
South Gare (Cleveland)	–	70	2 January 1976		
Kirkwall (Orkney)	–			118	7 February 1969

RAINFALL	Date records began	Maximum daily fall (mm)	Date
South England			
Martinstown	1955[6]	279	18 July 1955
Upwey (Friar Waddon)	1915	241	18 July 1955
Upwey (Higher Well)	1910[7]	229	18 July 1955
Upwey (Elwell)	1955[8]	211	18 July 1955
United Kingdom			
Martinstown (Dorset)	–	279	18 July 1955

Stations closed: 1, 1958; 2, 1979; 3, 1977; 4, 1968; 5, 1941 reopened 1950; 6, 1977; 7, 1957; 8, 1966.

TABLE 10 Climatological data for places in the United Kingdom based on the period 1941–70 except where indicated

	Altitude (metres)	Average annual rainfall (mm)	Average daily temperatures (°C) # Minimum Jan.	Minimum July	Maximum Jan.	Maximum July	Average annual duration of bright sunshine (hours)	Average annual no. of days with* Air frost	Snow lying
England									
Abingdon (Oxfordshire)	69	605	0.3	11.6	6.3	21.6	1544	57	13
Acklington (Northumberland)	42	644	0.0	10.3	5.5	17.9	1429	60	20
Birmingham Airport (W. Midlands)	96	679	0.1	11.2	5.7	20.5	1385	62	15
London (Kensington Palace)	25	640	1.7	13.3	6.6	22.2	1384[x]	35	7
Manchester Airport (Gr. Manchester)	75	819	0.5	11.7	5.8	19.6	1334	47	10
Plymouth/Mount Batten (Devon)	27	990	3.1	12.7	8.3	19.0	1678	25	3
Shawbury (Shropshire)	72	670	0.0	11.2	6.0	20.2	1368	63	17
Southsea (Hampshire)	2	702	2.4	13.9	7.1	20.7	1748	25	6
Waddington (Lincolnshire)	68	598	0.1	11.6	5.2	20.3	1503.	54	18
Wales									
Cardiff/Wales Airport (S. Glamorgan)	67	947	1.3	11.9	6.6	19.3	1571	36	8
Valley (Gwynedd)	10	871	2.5	12.0	7.5	18.1	1612	27	3
Northern Ireland									
Belfast Airport (Antrim)	68	912	0.6	10.7	6.1	18.1	1281	53	9
Scotland									
Aberdeen Airport (Grampian)	58	872	−0.9	9.6	5.0	17.5	1341	75	30
Balmoral (Grampian)	283	834	−2.8	8.1	3.7	17.4	1120[†]	116	63
Edinburgh Airport (Lothian)	35	677	−0.6	10.3	5.7	18.5	1294	66	14
Lerwick (Shetland)	82	1172	0.6	9.3	5.0	14.0	1067	53	32
Stornoway (Western Isles)	3	1094	1.3	10.1	6.4	15.7	1244	49	11
Glasgow Airport (Strathclyde)	5	991	0.1	10.8	5.8	18.6	1266	58	6

* Based on 1956–70 only.

[x] For Regents Park.

[†] For Braemar.

\# Referring to 24-hour (09–09 GMT) extremes. Adjustments have been made to those stations normally recording night minima (21–09 GMT) and day maxima (09–21 GMT). See Introduction to the series.

CLIMATOLOGICAL SERVICES AVAILABLE FROM THE METEOROLOGICAL OFFICE

The Meteorological Office collects and archives regular weather reports from a national network of observing stations, consisting of both Meteorological Offices manned by professional staff and co-operating stations operated by interested organizations or individuals. All these data are subjected to close scrutiny before being archived, to ensure consistency of standards, and are then available to meet the needs of the community.

Any undertaking which is at all weather-sensitive can benefit from a prior knowledge of the climate within which it is expected to operate. The building industry can use past weather statistics to estimate likely delays on contracts, architects and civil engineers need to know the likely extremes of weather which a design must withstand, and many industrial processes are dependent on atmospheric conditions for their success. The agricultural industry uses such information for a variety of purposes, many relating to the viability of new crops and the weather-related incidence and spread of pests and diseases.

In addition to special analyses of weather data for these purposes, the Meteorological Office can supply factual statements on weather conditions for legal or insurance purposes.

Enquiries related to aspects of past weather data should be directed to the appropriate address given on page 20 or, if more convenient, initially to your local weather centre (see opposite). Charges for the supply of information depend mainly on the staff time taken to meet the request.

Further information

Information leaflets and brochures describing in more detail the range of specialized services available from the Meteorological Office are available free from the same addresses. These leaflets and brochures also indicate the range of complex analyses that the Meteorological Office can undertake.

Forecasting services

For the day-to-day planning of outdoor work, special weather forecasts and warnings can be arranged to cover specific weather elements at agreed sites. Details may be obtained from:

The Director-General
Meteorological Office (Met O 7a)
London Road
Bracknell
Berkshire RG12 2SZ.

or from your local weather centre.

WEATHER CENTRES AND PUBLIC SERVICE OFFICES

Weather Centres

Bristol
The Gaunts House
Denmark Street
Bristol BS1 5DH

Bristol (0272) 279272

Cardiff
Southgate House
Wood Street
Cardiff CF1 1EW

Cardiff (0222) 390420

Glasgow
33 Bothwell Street
Glasgow G2 6TS

041—248 7272

Leeds
Oak House
Park Lane
Leeds LS3 1EL

Leeds (0532) 457703

London
284–286 High Holborn
London WC1V 7HX

01—430 5627

Manchester
Exchange Street
Stockport SK3 0ER

061—477 1017

Newcastle
Newgate House
Newgate Street
Newcastle-upon-Tyne NE1 5UQ

Tyneside 091—232 3808

Norwich
Rouen House
Rouen Road
Norwich NR1 1RB

Norwich (0603) 630164

Nottingham
Main Road
Watnall
Nottingham NG16 1HT

Nottingham (0602) 384094

Southampton
160 High Street-below-bar
Southampton SO1 0BT

Southampton (0703) 220646

Public Service Offices

Meteorological offices at:

Aberdeen Airport
Dyce, Aberdeen AB2 0DU

Aberdeen (0224) 724986

Belfast (Aldergrove) Airport
Belfast
Northern Ireland BT29 4ABA

Crumlin (084 94) 52804

Birmingham Airport
Birmingham B26 3QN

021—743 6240

Kirkwall Airport
Orkney KW15 1TH

Kirkwall (0856)3802

Sella Ness
Port Admin Area
Sullom Voe
Shetland ZE2 9QR

(0806) 242069

Royal Air Force Mount Batten
Plymouth
Devon PL9 9SH

Plymouth (0752) 493377

THE CLIMATE OF GREAT BRITAIN

This memorandum is one of a series which will cover the whole of Great Britain in due course, published in the Climatological Memoranda range. The Introduction (CM 113) to the series explains how various weather elements are measured. The areas to be covered are:

SCOTLAND

114 Borders Region
115 Edinburgh, Lothian Region and Stirling
116 Fife, Dundee and Perth
117 Aberdeen and Buchan
118 Moray Firth coastal Region
119 Northern Isles
120 Western Isles
121 Skye and the North-west
122 Argyll and the Inner Hebrides
123 The Grampians and Perthshire Highlands
124 Glasgow and the Clyde valley
125 Ayrshire and the Firth of Clyde
126 Dumfries and Galloway Region

ENGLAND

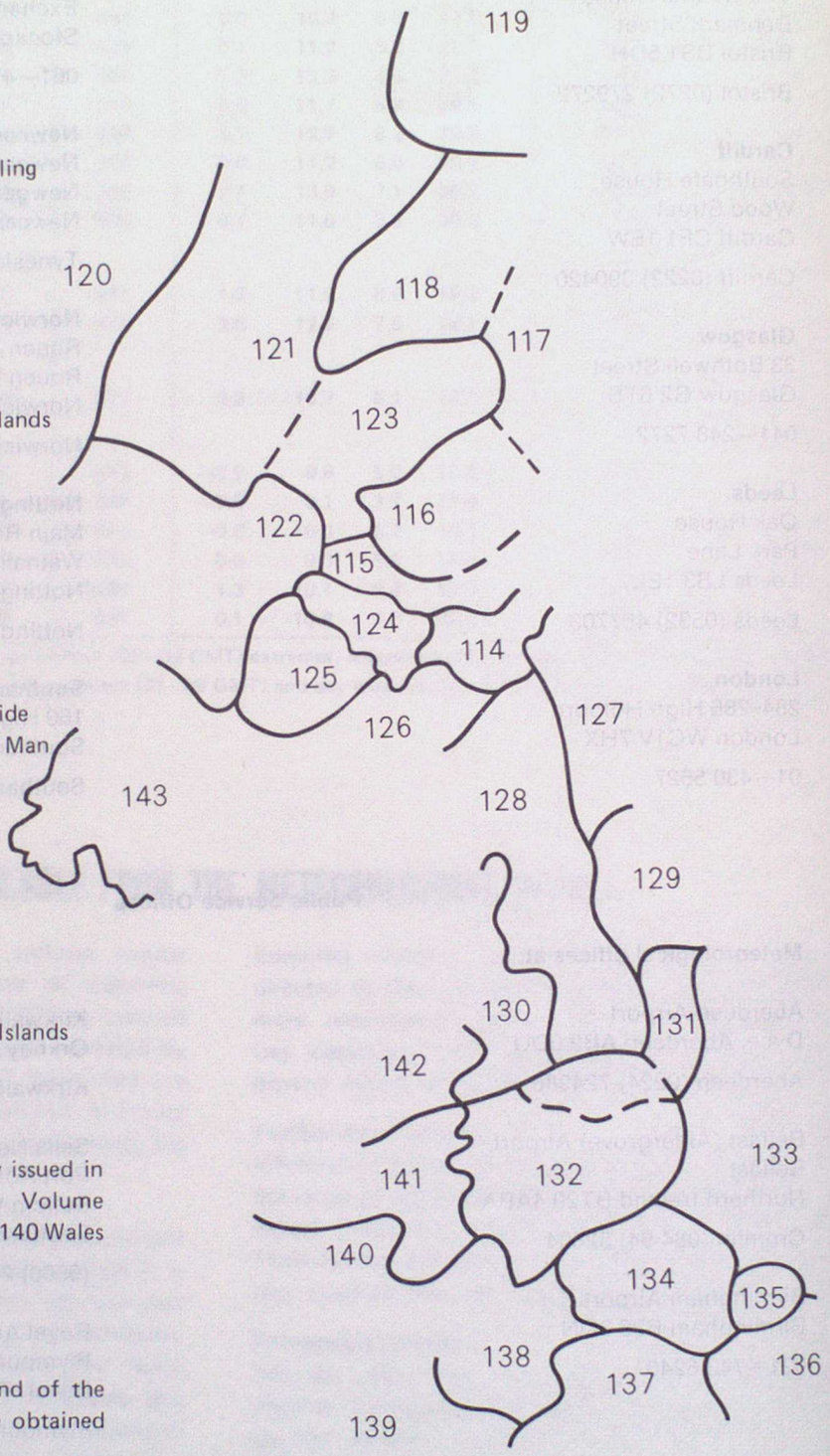
127 North-east England
128 Pennines and Lake District
129 East Yorkshire and North Humberside
130 Lancashire and Cheshire and Isle of Man
131 Trent Valley
132 Midlands
133 East Anglia and Lincolnshire
134 Thames Valley
135 London
136 South-east England
137 South England
138 Somerset and Avon
139 South-west Peninsula and Channel Islands

WALES

140 South Wales
141 Mid Wales
142 North Wales and Anglesey

} Now issued in one Volume No. 140 Wales

Also available
143 The Climate of Northern Ireland



Further details of these memoranda and of the services mentioned on page 18 can be obtained from:

FOR ENGLAND AND WALES

The Director-General
Meteorological Office (Met O 3b)
London Road
Bracknell
Berkshire RG12 2SZ

FOR SCOTLAND

The Superintendent
Meteorological Office
231 Corstorphine Road
Edinburgh EG12 7BB

FOR NORTHERN IRELAND

The Senior Meteorological Officer
Meteorological Office
Progressive House
1 College Square East
Belfast BT1 6BQ